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DECISION THE COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

FILE: B-203652.2, B-203652.3 **DATE:** June 18, 1984

MATTER OF: RMI, Inc.--Department of the Navy and Bell Aerospace Division of Textron, Inc. Request for Reconsideration

DIGEST:

1. Although protester bears the burden of proving its case, that burden is met if its protest is supported by an in camera inspection of records which the agency has refused to disclose to the protester.

2. While GAO defers to the procuring agency's opinion in matters of judgment, technical facts are reviewed when necessary to determine whether the agency acted reasonably in discharging its legal obligations.

3. Rational basis is lacking for rejection of proposal without conducting discussion where record shows that the evaluators misconstrued and ignored applicable performance criteria in evaluating proposals, did not evaluate proposals on a common basis, disregarded features of protester's proposal and misread and unilaterally adjusted data contained in the proposals.

The Naval Sea Systems Command and Bell Aerospace Division of Textron, Inc., request reconsideration of our decision in RMI, Inc., B-203652, April 20, 1983, 83-1 CPD 423. There we sustained RMI's protest that its proposal to furnish subsystem design and pilot production of a Landing Craft Air Cushion (LCAC) should not have been rejected. We concluded that rejection of RMI's proposal, which left only Bell in the competitive range, lacked a rational foundation.

On reconsideration, the Navy contends that our decision is erroneous. Bell agrees, adding that corrective action is no longer possible because the subsystem design contract it was awarded is substantially completed. On the other hand, RMI argues that our decision was fully justified.

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Before addressing these issues, we point out that in our prior decision we asked the Navy to advise our Office whether it would be feasible to reopen the competition. The Navy has not specifically responded to that request. However, the question of remedy was considered by the Congress in connection with its approval of the Department of Defense Authorization Act of 1984. As the Conference Report (H.R. Rep. No. 98-352, 98th Cong., 1st. Sess. (1983)) indicates, the conferees, in lieu of imposing specific restrictions proposed by the House of Representatives which would have limited the Navy's use of moneys appropriated for the LCAC program, agreed to direct the Navy to take certain actions which included evaluation of the feasibility of establishing a second source for the production of LCACs. The Navy has initiated a procurement process to establish a second design and production source for the LCAC program, which the Navy anticipates will include funded development and consideration of new proposed LCAC design and production approaches. See Commerce Business Daily, February 2, 1984. We think the Navy's action serves to afford RMI as much remedial relief as is feasible at this time. Consequently, we are withdrawing our request that the Navy determine the feasibility of reopening the protested procurement.

While these developments arguably make the issues raised on reconsideration academic, we think that the importance of the differences involved merits an exposition of our views on the substantive issues raised. By doing so, we acknowledge the importance of this case to the parties as well as to others in the procurement community who are concerned with technically complex procurements.

As explained below, we affirm our prior decision.

I. Background

The LCAC is a seaborne vehicle capable of hovering on a cushion of air which is forced under the craft by internal lift fans. RMI's rejection and the subsequent award of a subsystem design and pilot production contract to Bell were the culmination of a funded procurement process in which RMI and Bell were paid approximately $4 million each to develop competing system designs and technical specifications for a LCAC suitable for use in amphibious assault operations, together with production plans and cost estimates.

Upon being advised of Bell's selection, RMI requested and received a debriefing from the Navy and then protested to this Office. Its protest raised a number of issues relating to the competition and the Navy's award. RMI's primary complaint was that the Navy's action was not justified because the proposed RMI LCAC design, production plans, and cost proposal were fully responsive to the Navy's stated requirements. RMI also contended that notwithstanding any defects in its proposal, what it knew of the Bell design indicated to it that the Bell craft was underpowered.

The Navy responded that RMI's proposal was weak in all areas and was rejected for that reason. It generally denied RMI's statement of facts and submitted an affidavit from the Chairman of its Source Selection Evaluation Board (SSEB) stating that he had reviewed RMI's protest but found that RMI had presented "no substantive argument that had not been duly considered during the course of the evaluation." The Navy did not make its evidence available to RMI. As a result, our decision was based on our own in camera review of the documents.

Our review disclosed that RMI's proposal was rejected basically because, in the Navy's view, the RMI design was incapable of achieving high speed under sea state 3 conditions. Also, the Navy concluded that the width of the RMI craft created serious risk that difficulty might be encountered in entering and exiting the well deck areas of motherships (LSDs and LPDs) from which it is designed to operate. Although Bell outscored RMI in the evaluation of the management and cost aspects of its initial proposal, we concluded that the Navy's concern with the ability of the RMI craft to achieve sea state 3 performance and with craft width so influenced the evaluation that it controlled the selection decision.

We sustained the protest because we found that the Navy's conclusions regarding the technical inadequacies of the RMI craft had no rational basis in the record before us. We pointed out that: (1) the sea state 3 objective which RMI allegedly failed to meet was expressed as a goal rather than as a requirement; (2) system performance of the RMI and Bell craft did not appear to have been evaluated on a common basis; (3) the Navy, in evaluating the performance of the RMI craft, ignored the use of diffusers incorporated in RMI's design; and (4) the Navy faulted RMI with regard to the width of its proposed craft, without expressing similar concern regarding the Bell craft, which actually had a wider hard structure beam. We also questioned the Navy's evaluation of lift system air intake losses and weight deductions in computing the load carrying capability of the RMI and Bell craft.

The Navy and Bell challenge our findings. According to the Navy, the evidence shows that: (1) the Navy's evaluation of the proposals was founded on the stated evaluation criteria and both offerors were treated equally; (2) airflow capacity was evaluated properly; (3) the Navy did not erroneously downgrade RMI's performance claims, specifically with regard to the diffusers; (4) the Navy's conclusions regarding craft width and its impact on well deck operations, as well as air intake pressure losses, were proper; and (5) there were no improper weight deductions taken in computing load carrying capability. Additionally, the Navy contends the Bell proposal was clearly superior in the Management and Cost categories and any intrusion of the technical deficiencies into these areas was minimal.

II. Scope of Review

Initially, we consider the assertion by the Navy and Bell that our decision deviates from our Office's established and proper scope of review, which is simply to ascertain whether a rational basis exists for an agency determination. According to the Navy, we improperly conducted our own de novo technical investigation, subjecting the procurement to undue scrutiny, and consequently substituted our judgment for the rationally based findings of Navy experts.

We do not view our prior decision as deviating from the rule that we will not conduct a de novo review of proposals or independently determine their relative merits in deciding bid protests. The evaluation of proposals, we have frequently stated, is properly the function of the procuring agency. The Jonathan Corporation, B-199407.2, September 23, 1982, 82-2 CPD 260; Blurton, Banks and Associates, Inc., B-206429, September 20, 1982, 82-2 CPD 238. The exercise of discretion by procuring officials is questioned only if shown to be arbitrary, to lack a reasonable basis or to violate procurement statutes and regulations. Bray Studios, Inc., B-207723, B-207746, October 27, 1982, 82-2 CPD 373. Our decision sustaining RMI's protest was not based on de novo review, but on our examination of the record, from which we concluded that the Navy had no rational basis for its decision to reject RMI's proposal without conducting discussions with that firm.

We also do not view our decision as a departure from the rule that we will not ordinarily conduct an independent investigation in support of a bid protest. An independent investigation as we have used that term refers to fact finding by our auditors, normally involving on-site inspection of pertinent agency records and interviews with cognizant agency officials. Four-Phase Systems, Inc.--request for reconsideration, B-201642.2, April 22, 1983, 83-1 CPD 430; Informatics, Inc., 57 Comp. Gen. 217 (1978), 78-1 CPD 53. Nothing of that sort occurred in this case. As indicated, we did no more than review the record, which was provided primarily by the Navy in response to the protest.

As for the extent of review given this case, we point out that although a protester bears the burden of proving its case, proof may exist on the record even though the protester, denied access, is unable to cite it in support of his protest. As a result, it is our settled practice in such cases to examine the record in camera, to determine whether the agency's action had a reasonable basis. Alcoa Marine Corporation, B-196721, May 9, 1980, 80-1 CPD 335; Systems Consultants, Inc., B-197872, September 18, 1980, 80-2 CPD 203. That is what occurred here.

We further point out that, while we defer to the procuring agency's opinion in matters of judgment (unless it has abused its discretion), it is our practice to review technical facts when necessary to determine whether the procuring agency has acted reasonably in discharging its legal obligations. American Air Filter Co.--DLA request for reconsideration, 57 Comp. Gen. 567, 570 (1978), 78-1 CPD 443.

III. Preliminary Issues:

In turning to address the substantive aspects of the requests for reconsideration, we consider first the Navy's and Bell's contention that Bell's proposal was clearly superior to RMI's proposal. According to them, RMI's proposal was rejected because it was weak in many respects and, consequently, had no reasonable chance for award. Even if the technical conclusions in our prior decision were correct, they contend, we failed to place them in proper perspective. No correction of RMI's technical proposal could have improved it to the point that it would have been competitive with Bell's technical proposal, they insist.

The best evidence of the reasons for the Navy's refusal to conduct discussions with RMI is contained in the memorandum to the SSA, which he endorsed in a memorandum authorizing the action taken. The SSAC's memorandum stated that:

> "The RMI design is such that it would take extensive redesign . . . and delay the program by approximately six months in order to make it competitive with the Bell [proposal]. Due to the nature of the deficiencies in the RMI proposal, the SSAC concludes that there is no reasonable chance that RMI will be selected for award."

The SSAC's memorandum was in turn based on a formal report from the SSEB which makes it clear what the deficiencies were to which the SSAC referred. The Executive Summary prefacing the SSEB report stated that RMI's proposal should be eliminated from the competitive range because:

> "The RMI design is deficient in payload carrying capability due to underestimated lift system losses and overestimated lift and propulsion efficiencies. The hard structure width of the RMI design poses a significant risk which threatens successful well deck ship operations. Correction of the RMI proposal defects is not considered achievable without serious impact to LCAC program schedules and costs."

RMI's rejection thus was not based on the overall inadequacy of its proposal, as the Navy asserts, but on two specific deficiencies: insufficient load carrying capability and concern with the hard structure width of the RMI craft.

Our prior conclusion that concern with load carrying capacity and hard structure beam was the main cause of RMI's rejection did not ignore the fact that Bell outscored RMI in the management and cost areas as well as in the technical area. As we noted in our prior decision, the finding that sufficient load carrying capacity could not be attained without extensive redesign was passed on to all of the evaluation teams who were instructed to take it into account. Apart from this, the Management Category Report itself recognizes that deficiencies in the management area were fairly readily correctable.[1] Moreover, while, as also indicated in our prior decision, RMI might have had difficulty overcoming differences in the evaluation of its and Bell's cost proposal, cost was the least important consideration in selecting an awardee.

IV. Load Carrying Capability

Because RMI's rejection appears to have been based primarily on two specific deficiencies, we must examine whether either deficiency was so serious that the Navy was justified in concluding that RMI had no reasonable chance for award. However, since the RFP establishes the standard by which proposals are to be evaluated, the significance of an alleged deficiency must be examined in light of the RFP requirements. Of course, it is also incumbent upon a contracting activity in applying the standards established in the RFP to apply them to all offerors equally.

In our prior decision, we observed that the SSEB's determination that the RMI craft as proposed could not provide sufficient load carrying capacity was based on the application of a standard of performance for operations in a sea state 3 which was not a stated requirement. We further observed that the pertinent solicitation document denoted "Top Level Requirements" (TLR) defined sea state 3 performance as a goal and that a goal is not the same thing as a requirement. Obversely, we pointed out that even if the sea state 3 performance criteria defined such a requirement, the Navy relaxed it with respect to Bell because the evaluators

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[1]Reflecting our view that such deficiencies were correctable, we observed in our prior decision that we were focusing only:

> "on those alleged technical deficiencies which were material to RMI's rejection. The SSEB findings identify a variety of deficiencies in the RMI and Bell proposals, which, however, appear to have been correctable through discussions and which are not shown in any event to have independent significance in determining the Navy's action."

This approach was consistent, of course, with the applicable legal standard which requires that a proposal must be included for discussions unless it is so defective that meaningful discussions are precluded. PRC Computer Center, 55 Comp. Gen. 60 (1975), 75-2 CPD 35.

found that Bell craft could not sustain sea state 3 performance without exceeding the maximum continuous power restriction applicable to the engines it proposed.

According to the Navy, it evaluated proposals equally with respect to the TLR. The Navy contends, moreover, that we improperly considered the TLR to state a goal when referring to RMI and to state a requirement when referring to Bell. This led us to the mistaken conclusion that the Navy treated the offerors unequally, the Navy says. However, the Navy concludes, our inconsistent characterizations of the specified sea state conditions does not matter since RMI's proposed design could not sustain speeds in excess of what is referred to as hump speed. The Navy says it was understood by all of the parties that the LCAC was to be capable of operating above "hump speed" in sea state 3 and that, if it could not, it would simply amount to a fantastically expensive barge.

Section 2.2.3.1.2 of the TLR states that:

> "A speed in excess of 30 knots is the goal for the following conditions:
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> o Sea State 3;
> o 80 degrees F;
> o 120,000 pound payload;
> o Engine power less than or equal to continuous rating;
> o Most adverse heading relative to seas and wind;
> o Acceleration over hump may use reserve power rating and need not be achieved at the most tactically effective heading."

It is clear, we think, that section 2.2.3.1.2 established a goal, not a mandatory requirement. TLR section 1.1.4 stated explicitly that:

> " . . . the Section of this TLR [dealing with technical performance standards] shall be taken as specific requirements or constraints <u>unless</u> . . . <u>stated</u> <u>as</u> <u>a</u> <u>goal</u>." (Emphasis added.)

We agree, however, with the Navy that the craft proposed were required to be able to operate over hump speed. Section 2.2.3.1 of the TLR states that the LCACs are to "sustain" speed in excess of that required to remain above hump speed. Our decision did no more than recognize the difference between the requirement of section 2.2.3.1 and the goal set forth in section 2.2.3.1.2.

As for the Navy's evaluation, we point out that hump speed is a term of art. A LCAC typically consists of a hard structure which sits astride a lower flexible structure or skirt. A seaborne air cushion vehicle can be operated in either an: (1) "off-cushion" mode in which the craft floats in the water or (2) "on-cushion" mode in which internal lift fans are used to inflate the skirt and support the craft above the water. In turn, an on-cushion seaborne craft may operate below or above hump speed. At hump speed, approximately 18 to 20 knots, an on-cushion seaborne LCAC comes out of the depression formed by the bubble of air trapped under it, crosses its bow wave, and rides on the surface with the botton of its skirt essentially free of the surface except when hit by waves. Transition through hump speed results in a reduction in drag, allowing the craft to accelerate until drag again equals available thrust. This drag reduction is normally sufficient to assure that a craft which can transition hump speed in sea state 3 will reach 30 knots provided the conditions under which it is operating do not change.

The Navy's evaluation was based on a calculation of the weight the craft could carry into a 16 knot headwind at a velocity over the water at 31 knots. Because the Navy performed its validation analysis in this way, it focused its evaluation too narrowly. The Navy read the conditions which describe the goal in section 2.2.3.1.2 as conditions which must be met in satisfying the hump speed transition requirement in section 2.2.3.1, which contains no such conditions. The conditions under which the LCACs must transition hump speed are contained elsewhere in the TLR, principally in requirements that the LCAC be capable of performing a specified mission scenario.[2]

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[2] We disagree also with the view expressed by the Navy and Bell that the parties themselves recognized and treated the criteria in section 2.2.3.1.2 as a requirement rather than as a goal. As we read Bell's and RMI's proposals, both vendors treated the sea state 3 criteria as a design objective, i.e., as an internal engineering design requirement. Both thought they had met the objective. The fact that each sought to meet the objective does not elevate it to the level of a requirement.

It has not been argued that RMI's craft would not have met the mission scenario requirements, which we assume state the essence of the Navy's needs. Rather, it appears likely that RMI's craft would have met the speed requirements in that scenario. The only thing it might not have been able to do, according to the Navy's analysis, was to sustain post-hump speed if, when operating under sea state 3 conditions, it turned into a 16 knot headwind. It could do even this at a payload of less than 120,000 pounds.

Finally, we point out that, in fact, the Navy in applying its sea state 3 test went well beyond even what it might have demanded had the TLR criteria been written as a requirement rather than as a goal. The Navy's validation analysis proceeded in four steps in which the Navy calculated adjustments to payload to account for: (1) differences in projected performance, (2) so-called "battle" configuration add-ons, (3) "real world degradation," (4) use of maximum intermittent, in lieu of maximum continuous, power. This resulted in a set of numbers which purport to show that only the Bell craft with upgraded engines operating at maximum intermittent power can carry 120,000 pounds under sea state 3 conditions.

Based on this data, the SSEB reported to the SSAC, in effect, that the Bell craft (but not RMI craft) met the TLR for a battle configured craft taking craft degradation into account. Examination of the Technical Category Report indicates that, although the evaluators were aware that some of the criteria they were applying were not specified in the TLR, they believed it was necessary to evaluate craft performance using more rigorous standards. Finding that the Bell craft might not assure sea state 3 performance carrying 120,000 pounds after accounting for performance degradation, they concluded that it was still a "viable candidate," in their words, because sufficient payload could be carried if the engine power restriction were "relaxed" (again, their choice of words), to permit use of maximum intermittent power. (Throughout, the report appears to use the term "viable" as a synonym for "capable of being made acceptable"; it concludes with respect to RMI that its design "should no longer be considered viable.")

Our reference to this "relaxation" (by allowing the use of intermittent power) was attacked by the Navy as "illogical." We see nothing illogical in observing that, assuming the standard which the evaluators applied had been a requirement, it was relaxed with respect to Bell.

V. Specific Technical Issues

The primary focus of our conclusion that the Navy's exclusion of RMI without discussions was improper was based on specific aspects of the Navy's technical analysis. These concerned the Navy's: (1) failure to evaluate lift system performance of the RMI and Bell craft on a common basis; (2) its disregard of the diffusers, a major component in the RMI lift system design, in computing lift system performance; (3) its failure to evaluate craft interface problems fairly, due to misinterpretation of the width of the Bell craft; (4) an erroneous adjustment of lift system air intake losses; and (5) the use of improper weight deductions.

The Navy and Bell object to many of our findings in these areas. According to them, our conclusions are wrong.

Common Model:

Concerning first the evaluation of proposed lift system performance on a commmon basis, we pointed out in our decision that the linchpin of the Navy's evaluation of projected sea state 3 performance is an assumption that each vendor's projected air flow capacity had to be maintained. Where the Navy questioned craft design (both for RMI and Bell), it computed offsetting allowances to restore lift system airflow to these levels. It then calculated the power remaining to propel each craft, and compared its results to vendor predicted drag in sea state 3 to determine whether sufficient power was available to drive the craft at 31 knots.[3]

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[3]Prior to our decision, RMI was unaware of the methodology which the Navy used. In briefs filed in opposition to the requests for reconsideration, RMI contends that the use of the methodology itself has no rational basis because, assuming a craft is incapable of delivering its design airflow, the skirt clearance will decrease (with a concomitant increase in drag) until the pressure of the air trapped under the craft is sufficient to support it. The true impact on load carrying capacity in actual practice is not predicted by the Navy's method, RMI contends. While we agree that RMI's discription reflects the physics of LCAC performance better than the Navy's assumption that design airflow will be maintained, we do not find it necessary to discuss RMI's views in detail.

Rather than providing a common basis for comparison of the competing craft, we observed that this approach incorporated the mathematical models which RMI and Bell used to establish their lift system air flow design criteria and to predict craft drag. These models, we pointed out, differed significantly. The difference in the models, we noted, has to do with the theoretical bases of LCAC design such as the relationship between drag and the clearance maintained between the surface of the water and the craft skirt when the craft is hovering. The skirt clearance allowed determines the volume of air trapped under the craft which will escape and, thus, the volume flow demanded of the lift system fans.

We concluded that, by assuming that skirt clearance could be reduced without producing unacceptable drag characteristics, Bell was able to propose a reduced clearance and to make its craft appear to demand substantially less lift system air flow and power than RMI designed its craft to provide. Bell's data shows, as we stated, that its craft has less drag than RMI's although they are similar in size, notwithstanding that RMI's craft was designed to provide up to 60 percent more lift system air flow than Bell's. The Navy, we found, assumed, without performing any supporting analysis, that this difference in projected air flow was required by differences in the skirt design of the two craft.

The Navy acknowledges that no analysis was conducted during the evaluation to specifically compare the difference in drag between the RMI proposed loop and pericell and Bell's bag and finger skirts. However, the Navy says that general characteristics of the two skirt types are well known within the air cushion community and that the loop and pericell skirt tends to cause more drag and requires greater lift airflow than the bag and finger type. Nevertheless, the Navy states, it examined the offerors' data and compared their predictions with data developed in testing prototype (JEFF) craft. Based on this, the Navy says it concluded that RMI's predicted drag could be reduced by 6-1/2 percent.

Concerning the underlying assumption that each vendor's projected lift system air flow had to be maintained, the Navy says it based its assumption on sound engineering judgment and risk assessment. Concerning drag, the Navy argues that RMI proposed a very narrow margin between thrust and drag, which would have been further diminished by the increased drag which resulted from reduced air flows. Allowing the thrust to drag margin to narrow, the Navy contends, would have incresed the risk that the craft would be unable to achieve hump speed. Moreover, the Navy argues that it could not consider the possible consequences of operating at reduced air flow because it lacked information with respect to possible adverse effects of such operations on craft stability and increased drag. Stability was a matter of concern, it explains, due to "plow-in," a phenomenon in which the craft encounters a pitch instability which causes it to nose suddenly into the water and decelerate abruptly.

We first point out that this last contention is misplaced. RMI's stability data and its analysis of stability actually were based on reduced air flow.

Moreover, we did not say in our prior decision that there was no difference in the performance characteristics of the bag and finger and the loop and pericell skirts. While we referred to the need to evaluate proposals on the basis of a common model, we did not suggest that there could not be differences in predicted performance if those differences were related to actual differences in skirt design. We recognized that skirt design could have an effect on drag.

Our concern was that there was no foundation on the record which permitted a reconciliation of the differences in lift system performance characteristics which the Navy, by accepting Bell's and RMI's assumptions, attributed to the Bell and RMI craft or which, therefore, would explain why one of the craft (RMI's) could reasonably be expected to require approximately 60 percent more lift system air flow than the other, but would still have substantially more drag.[4]

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[4] The Navy has cited various preexisting documents to support its contention that the difference in skirt efficiency is a matter of common knowledge in the air cushion vehicle industry. The documents show that development of the bag and finger design was a substantial improvement over earlier skirt designs but that the loop and pericell skirt is a variation of the bag and finger skirt (as distinguished from those earlier designs) in which the fingers take the form of truncated cones extending from the bag (or "loop") to the water. None of the preexisting documentation appears to show that the difference in drag between the loop and pericell (as designed for the JEFF-(A) prototype) and bag and finger skirts (JEFF-(B)) was great. The principal document which was submitted on this point concludes that performance predicted for JEFF-(A) and JEFF-(B) did not differ appreciably and indicates that predicted performance for the craft, at least in their final configurations, showed acceptable corollation with test data.

In fact, the conclusions expressed in our prior decision are based on examination of the air cushion vehicle drag models which RMI and Bell's proposals indicate they used in developing their LCAC designs. Three models are involved: (1) a LCAC Math Model (Navy model) developed by the Navy several years ago; (2) the RMI model (referred to by RMI as the "Mod 2" model to distinguish it from earlier RMI models); and (3) the Bell model. The RMI and Bell models evolved from the Navy LCAC Math model. Each consisted of a number of terms or "components" to account for a particular element of drag. Examination of these components in detail indicates that the models differ substantially with respect to their constitutent subcomponents, particularly those which deal with calm water skirt wetting and rough water (sea state) skirt drag. The relationship between these drag subcomponents and craft speed differs from one formulation to another with the RMI rough water subcomponent including a wave making term which is absent from Bell's formulation.

In turn, these differences in the formulation of the skirt drag imply very significant differences in predicted drag. The Bell model projects skirt drags at low skirt clearances which, Bell acknowledges in its proposal, are below the drag predicted by the Navy LCAC math model, particularly under low sea state (calm water) conditions. RMI's model is comparatively more sensitive to both skirt clearance and sea state, with the result that RMI would predict a total of approximately 10,000 pounds (40 to 50 percent) more drag than would Bell under sea state 3 conditions at 31 knots if both maintain the skirt clearance (0.167 feet) which Bell proposed.

While as this analysis indicates it is with respect to sea state 3 that the disparity in the drag predicted by the RMI and Bell models becomes truly significant, the record discloses that the Navy has limited experience with the JEFF prototype craft under sea state 3 conditions. Moreover, the JEFF data plotted in Bell's proposal for the bag and finger skirt includes only two points in sea state 3 into a substantial headwind and no sea state 3 data points for which skirt clearance was reported. And, apparently, when the Navy says it viewed the differences in predicted performance as reasonable based on its experience, it is referring to sea state 2.[5]

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[5] The Navy's claim that it considered and in fact reduced RMI's sea state 3 drag by 6-1/2 percent is based on a graph which the Navy says was annotated by the evaluators. In fact, the curve which is annotated is a RMI plot of sea state 2 performance predicted for the JEFF-(A) prototype.

Finally, it apears that the Navy itself was concerned with the differences in drag which were predicted. Without our knowledge, the Navy conducted an extensive series of tests during the time we were considering RMI's protest. Examination of the results of these tests (furnished at our insistence during this reconsideration) suggests that they were conducted to answer questions similar to those which our decision identified as particularly troublesome, including the effect of skirt clearance and differences in the loop and pericell and the bag and finger designs under sea state 3 conditions.

While the need to conduct these tests after award supports our view that the Navy did not have an adequate basis for comparison of the proposals at the time it conducted its evaluation, our examination of the data with the results predicted by the RMI and Bell models shows reasonably good agreement between them. Assuming the validity of the test results,[6] it is possible to conclude that had the Navy conducted discussions and concurrently performed appropriate testing (which we think is what should have been done), it ultimately would have concluded that the differences in skirt performance which the parties predicted for sea state 3 condition was in fact the result of a real and substantial difference in the drag characteristics of the skirts proposed. Presumably, however, discussions conducted in conjuction with such testing would have produced revisions to RMI's proposed skirt design, since its craft was designed, as RMI indicated in its proposal, so that that it will accept a bag and finger skirt.

Diffusers:

We next consider the Navy's criticism of our findings concerning the evaluation of lift system pressure losses.

As explained in our prior decision, the fan system RMI proposed consisted of eight mixed-flow fans each of which discharged air into the skirt system through a diffuser. A diffuser consists of a duct with cross-sectional area increasing in the direction of flow, much like a horn. Diffusers are commonly used in turbomachinery to reduce the velocity of a fluid (in this instance air) by converting its kinetic energy into increased static pressure before

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[6]The test report we examined was in draft form. To our knowledge, a final report has not been issued; why, we do not know. We do know from the draft report, however, that there was some problem with the condition of the loop and pericell skirt used for the tests.

discharging it. Our prior decision noted, however, that the Navy evaluator who reviewed this portion of RMI's design disregarded the diffusers, because he concluded, based on an RMI sketch, that the RMI craft would not work due to duct system losses. Observing that the evaluator knew that diffusers were proposed, what diffusers do, and why RMI had included them, we concluded that with nothing before him except the sketch, the most the evaluator could have concluded was that RMI did not provide sufficient detail regarding its proposed duct system to show that the design would perform as claimed.

Although the Navy does not dispute our conclusion in this regard, it contends that it did not rely on the evaluator's findings. According to the Navy, its evaluation was based on a calculation of dynamic head (pressure) for both the RMI and Bell craft. RMI and Bell were treated equally, the Navy insists, because the same formula was applied to each.

The Navy has furnished the calculations on which its argument is based, which confirms our understanding as to how the evaluation was done. Pressure loss depends upon the velocity of the air times itself, or, in other words, upon velocity squared, at the point in the system where that quantity is measured. Since velocity is inversely proportional to the cross-sectional area of the duct through which the air is flowing, it is of critical importance that, as the record shows, the Navy's calculations were based on the area at the fan exit, not the diffuser exit. Because the diffuser exit was not used, however, pressure recovery in the diffusers was not taken into account.

We do not find, either, that the offerors were treated equally even though we recognize, as Bell points out, that it also included diffusers in its design. Omission of the diffusers affects the evaluation of the proposed craft unequally because the RMI craft was designed to deliver a larger volume of air, which could be provided using proven equipment only by assuming that the air would exit its fans at high velocity. Bell, designing for a lower capacity lift fan system, assumed lower velocities. Since the losses which the Navy calculated depend upon velocity squared, the effect of a failure to account for pressure recovery in the diffusers is disproportionate, amounting to a substantial portion of the lift system losses assessed against RMI but having limited impact on Bell.

The second portion of the Navy's adjustment of lift system pressure loss criticized in our decision concerned lift system intake losses. According to the Navy, it evaluated such losses properly. It says RMI unrealistically assumed that a portion (6.8 pounds per square foot or psf) of its intake losses (10.4 psf) could be recovered through forward motion of the craft and that to correct this error it computed a new intake loss figure by adjusting the figure Bell used (15 psf) upward to account for the higher intake velocity of the RMI design.

We point out that the data in question was to be reported on a form entitled "Lift System Pressure Diagram" which, among other things, provided for recovery of a portion of lift system losses in the manner in which RMI accounted for them. It also appears that the Navy misread Bell's proposal, which shows that Bell erroneously entered 15 psf (actually the difference in volute exit static and total pressure) on the form. Bell did not assume a 15 psf inlet loss, as the evaluators assumed, but rather (as confirmed by sample calculations in its proposal) an inlet loss of 3.75 psf based on air velocity at the inlet grill. Following the Navy's methodology, extrapolation from this figure indicates an inlet loss for RMI of 5.11 psf, or 1.51 psf more than RMI assumed, not an inlet loss of 23.5 psf, which was assessed.

Craft Interface:

In addressing the Navy's response to our conclusions concerning the so-called craft interface issue, we first observe that our prior finding, that the width of the Bell craft was misrepresented to the SSAC and SSA, is not rebutted. The SSEB reported the hard structure beam of the Bell craft as 43 feet 8 inches. This excludes semi-pneumatic fendering and its supporting structure which runs along the entire forward two thirds of the Bell craft. On the other hand, the width of the RMI craft was reported as 46 feet 0 inches, a figure which includes steel rubrails which were part of the RMI fendering system. With semi-pneumatic fenders mounted on rigid metal standoffs, the Navy admits, the Bell craft had an effective beam of 46 feet 2 inches along the forward two thirds of its length and 46 feet 8 inches at the stern.

The record shows that the risk posed by the RMI design was evaluated by comparing it to JEFF-(B). Although the Navy argues that the Bell craft was not considered to be without risk, there is no indication that a similar analysis was performed with respect to the Bell craft. The evaluators did not note that the Bell LCAC without fendering and standoffs was as wide as the Bell JEFF-(B) with fendering.

Nevertheless, the Navy says the conclusion in our prior decision that the hard structure of the Bell craft was actually wider than the hard structure of the RMI LCAC demonstrates our lack of understanding of the interface problems, particularly with regard to the bow insertion maneuver. Concerning the nature of the bow insertion maneuver, the Navy explains that:

> "The well deck entry requires the craft to approach and overtake the mothership while both vessels are underway. The craft must then align itself with the ship's well deck axis to permit bow insertion and a smooth crossing of the ship's transom sill. The sill crossing maneuver must be done smoothly and rapidly, since the craft is extremely vulnerable during the transition from the ship wake environment to the well deck, when the craft is only partially in the well. At this point, the craft is subject to the effects of both ship motion and outside sea conditions and will experience the maximum relative motion between craft and ship structure. In this position, the craft is exposed to the danger of severe structural damage, particularly in heavy seas, if the entry maneuver is interrupted and the craft is stuck. The mothership well deck entrance opening is approximately 48' wide between batterboards. In a seaway, the well deck entrance is a moving target for the approaching craft, and both vessels will have unsynchronized movement laterally due to combined sway and yaw, vertically due to combined pitch and heave, and rotationally due to roll."

In addressing these concerns, we point out that the Navy's description of how the bow insertion maneuver is to be performed fails to mention or fully explain several significant details. In fact, offerors were permitted to specify the direction in which the craft are moving when the maneuver is executed and RMI specified a direction minimizing roll. Second, pitch and heave, which relate to vertical motion, are not relevant to clearance between the LCAC and the batterboards running along the inside of the well deck. Third, the Navy refers to the LCAC and mothership as underway. This evidently is referring to the maneuver as it would be performed with the LCAC on cushion. At the same time, the Navy refers to the risk of severe structural damage if the LCAC becomes stuck during entry in heavy seas due in part to relative movement of the craft in pitch, heave and roll. However, these arguments are based on unwarranted assumptions; the TLR, which specified the conditions to be assumed for LCAC recovery operations, did not require that the LCACs be capable of performing an on cushion entry in heavy seas.

Further, commenting on how differences in the RMI and Bell craft might be significant, the Navy says:

> "Both craft possessed bumpering systems or fenders. . . . The resulting overall beam for the RMI craft was 47'6" at the bow, lower sidewall and stern and 45'10" at the upper sidewall. The likely consequences of RMI's greater overall hull width and tighter clearances would be unavoidable bumper and inflated fender impact and probable upper hull impacts. Also, the relatively soft construction of RMI's inflatable fender results in small yaw misalignment tolerance and a strong likelihood of craft jamming when the craft partially entered the well deck of the ship."

We agree with the Navy that the characteristics of the Bell and RMI bumpering or fendering systems differ. RMI proposed a stronger hull design (according to the evaluators) and protected it with heavy steel rubrails running the length of the craft. Additionally, RMI used short lengths of hollow elastic rubber "D" shaped bumpers in vital areas and portable inflatable bumpers. On the other hand, Bell protected a comparatively fragile hull by installing extensive fenders--literally, commercially available bus bumpers attached to a stand-off structure. The Bell fender structure extends along much of the periphery of the LCAC.

The Navy's analysis of the impact of these differences in fendering systems, however, overlooks a number of apparently significant factors. For example, the Navy's reference to RMI's craft as having a 47 foot 6 inch beam is based on deployment of the RMI portable inflatable bumpers. RMI's proposal calls for their use on an as-needed basis; its craft handling scenarios (included in the proposal) do not call for their deployment in connection with well deck operations except in handling the craft once it is inside the well deck area.

The Navy inappropriately treats the Bell fendering system as comparable to the RMI inflatable bumpers. This is because the Bell fendering is essentially a rigid collision impact absorption system, i.e., as Bell admits in its proposal, hard structure. The RMI portable inflatable bumpers, like the RMI hollow elastic "D" bumpers, are soft, not hard structure, and are of very limited extent. On the other hand, if soft structure is to be considered, the beam of both the RMI and Bell craft is approximately 47 feet 0 inches on cushion due to the skirt.

According to the Navy, however:

> "In addition, in evaluating the relative degree of interface risk between the Bell and RMI designs, it was apparent to the Navy that the overall width (hull and bumpers) of the Bell craft could be much more easily reduced, if found necessary, than could the RMI's craft's width. This was due to the Bell hull width being approximately 1'10" more narrow than the RMI design, and the ease with which Bell could reduce or eliminate the structural standoffs on which it mounted semi-pneumatic bumpers."

This contention is untenable. The Navy fails to take into account Bell's statement in its proposal that "The standoff distances are considered to be the minimum acceptable for craft safety." Because the upper side walls of the Bell craft rise vertically (the sidewalls of the RMI craft taper inward), the side of the Bell craft would be unprotected if the standoffs and fendering were removed or reduced.

We have carefully considered the Navy's view concerning the craft interface question. However, we still conclude that our original decision was correct.

Conclusion:

Our prior decision is affirmed. In light of the Navy's actions taken subsequent to issuance of the decision, we withdraw the request that the Navy advise as to the feasibility of reopening the competition.

for Milton J. Socolar
Comptroller General
of the United States